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03256636.6

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Cargill Incorporated  
15407 McGinty Road West  
Wayzata,  
Minnesota 55391  
ETATS-UNIS D'AMERIQUE

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Process for preparing solidified maltitol and its use in food and pharma products

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**PROCESS FOR PREPARING SOLIDIFIED MALTITOL AND ITS USE IN  
FOOD AND PHARMA PRODUCTS**

5 Technical Field

The present invention relates to a process for preparing solidified maltitol and its use in feed, food, pharma and cosmetic products.

Background

10 Maltitol or  $\alpha$ -D-glucopyranosyl-4-D-sorbitol is a polyol obtainable by hydrogenation of maltose.

It is known to prepare anhydrous crystalline maltitol by inducing the crystallization of said maltitol in a syrup sufficiently rich in this product and sufficiently purified.

15

US 4,408,041 relates to a crystallization process wherein maltitol solution can be used to grow anhydrous crystals of maltitol by the addition of seed crystals at a supersaturated concentration.

20 US 6,120,612 covers a continuous manufacturing method for anhydrous crystalline maltitol. The process starts with a maltitol rich syrup, which is heated in a concentrating step, followed by a seed crystal adding and mixing step accompanied by more heating, to give a masseculite; and a crystal aging step where the masseculite is subjected to disintegration, mixing, stirring and transfer in an atmosphere in which  
25 temperature and moisture are adjusted to proceed the crystallization.

EP 0 561 585 relates to a method for manufacturing powdery or granular crystalline maltitol, which comprises adding seed crystals of maltitol at a temperature lower than the melting point of the seed crystals of maltitol to an aqueous solution of  
30 maltitol with 1-15% by weight of moisture content; and a shearing force is applied continuously.

US 5,932,015 provides an economical method for manufacturing crystalline maltitol by adding a crystalline mixture solid powder containing crystalline maltitol as seeds.

5

EP 1 207 164 describes the continuous mixing of maltitol syrup and seed crystals by rotation of the receptacle.

EP 1 300 414 describes the crystallization of maltitol by providing shear force to a maltitol aqueous solution in the presence of air bubbles.

EP 0 741 140 and EP 0 816 373 describes a process for manufacturing crystalline maltitol and crystalline mixture solid containing crystalline maltitol.

There is a further need for having a process for preparing solidified maltitol in high yields and without the need of expensive spray-drying.

The current invention provides such a process.

## Summary of invention

The current invention relates to a process for preparing solidified maltitol and said process is comprising the following steps:

- a) turbulating a powder of maltitol and a fluid at a temperature between room temperature and melting temperature of maltitol for obtaining granulated product,
- b) drying of granulated product,
- c) reducing particle size of dried granulated product for obtaining solid product,
- d) optionally recycling said solid product into step a) as powder of maltitol until obtaining in step c) a solid product with a content of maltitol lower than or equal to content of maltitol in powder of maltitol of step a).

The current invention relates to a process wherein in step a) the powder of maltitol is turbulated with an inert gas. The current invention relates to a process wherein the inert gas is nitrogen gas or air.

5 The current invention relates to a process wherein in step b) drying of granulated product is carried out with an inert gas at a temperature above room temperature and below melting temperature of maltitol.

Preferably the treatment of step a) is taking place in a fluid bed.

10 In addition, the current invention relates to a process wherein the fluid is a maltitol syrup comprising a solid content of between 40% and 80% and maltitol content greater than 70%.

The temperature in step a) is between 50°C and melting temperature of maltitol, preferably between 70°C and melting temperature of maltitol, more preferably between 80°C and melting temperature of maltitol.

15 The current invention relates to a process wherein content of maltitol of solid product of step c) is at least 1% w/w lower than content of maltitol of crystalline maltitol, preferably 2% w/w, more preferably more than 3% w/w lower than content of maltitol of crystalline maltitol.

A specific embodiment of the current invention relates to a process which is comprising the following steps:

- 20 a) loading powder of maltitol into fluid bed basket,  
b) having air inlet temperature of more than 80°C,  
c) adding into the feeding basket of fluid bed as fluid a maltitol syrup with solid content of 70%,  
25 d) spraying through nozzle said fluid onto powder of maltitol for obtaining granulated product,  
e) drying said granulated product for obtaining a dried granulated product with a moisture content below 1%, preferably below 0.5%,  
f) milling of said dried granulated product for obtaining a solid product,  
30 g) optionally recycling said solid product into step a) until obtaining in step f) a solid product with a maltitol content from 95% to 98%, preferably from 95% to 97%, more preferably from 95.5% to 96.5%.

The current invention further relates to the use of solidified maltitol in feed, food, pharma and cosmetic products.

Said food products are selected from the group consisting of bakery products, confectionery, chewing gum, and coating of edible cores.

5        The current invention relates to a bakery product comprising flour, fat, sweetening agent and optionally intense sweeteners, and characterized in that sweetening agent is comprising from 25% to 100% of said solidified maltitol, and the remainder of the sweetening agent is selected from the group of sucrose, glucose, fructose, fructose syrups, invert sugar, polyols and mixtures thereof.

10       Furthermore, the current invention relates to tablets comprising from 2% to 100% solidified maltitol of the current invention.

#### Detailed invention

15       The current invention relates to a process for preparing solidified maltitol and said process is comprising the following steps:

- a) turbulentating a powder of maltitol and a fluid at a temperature between room temperature and melting temperature of maltitol for obtaining granulated product,
- b) drying of granulated product,
- 20       c) reducing particle size of dried granulated product for obtaining solid product,
- d) optionally recycling said solid product into step a) as powder of maltitol until obtaining in step c) a solid product with a content of maltitol lower than or equal to content of maltitol in powder of maltitol of step a).

25       The powder of maltitol can be obtained from any process for preparing maltitol containing syrups wherein maltitol is the main ingredient.

At the start-up of the process, the maltitol powder in step a) can be crystalline maltitol. The content of maltitol in crystalline maltitol is from 99.7% w/w to 100% w/w.

The powder of maltitol is turbulentated in a stream of inert gas. The inert gas can be nitrogen gas and/or air.

30       The current invention further relates to a process wherein that treatment of step a) is taking place in a fluid bed. Besides the inert gas, fluid is present. The quantity of

powder of maltitol is bigger than the amount of fluid. Preferably the amount of fluid is about 15 to 35% based on dry substance of powder.

The fluid can be a maltitol syrup comprising a solid content of between 40% and 80% and maltitol content greater than 70%, based on dry substance.

5        The temperature in step a) is between 50°C and melting temperature of maltitol, preferably between 70°C and melting temperature of maltitol, more preferably between 80°C and melting temperature of maltitol.

10       The current invention relates to a process wherein content of maltitol of solid product of step c) is at least 1% w/w lower than content of maltitol of crystalline maltitol, preferably 2% w/w, more preferably more than 3% w/w lower than content of maltitol of crystalline maltitol.

A specific embodiment of the current invention relates to a process which is comprising the following steps:

- 15       a) loading powder of maltitol into fluid bed basket,
- b) having air inlet temperature of more than 80°C,
- c) adding into the feeding basket of fluid bed as fluid a maltitol syrup with solid content of 70%,
- d) spraying through nozzle said maltitol fluid onto powder of maltitol for obtaining granulated product,
- 20       e) drying said granulated product for obtaining a dried granulated product with a moisture content below 1%, preferably below 0.5%,
- f) milling of said dried granulated product for obtaining a solid product,
- g) optionally recycling said solid product into step a) until obtaining in step f) a solid product with a maltitol content from 95% to 98%, preferably from 95% to 97%, more preferably from 95.5% to 96.5%.
- 25       to 97%, more preferably from 95.5% to 96.5%.

Preferably the fluid is sprayed through a multi-head nozzle.

The drying of the product is requiring about 15 to 40 minutes and depends upon the amount of fluid.

The milling can be performed in any type of mill.

The current invention can provide a solidified maltitol with a moisture content below 0.5% and a maltitol content between 95% to 98% and the remainder being from 0.5 – 2% w/w sorbitol, from 0.5 – 3% w/w DP3 and from 0.2 to 0.5% w/w DP4.

Furthermore, the current invention relates to the use of said solidified maltitol in feed,  
5 food, pharma and cosmetic products.

Said food products are selected from the group consisting of bakery products, confectionery, chewing gum, and coating of edible cores.

The current invention further relates to a bakery product which is comprising flour, fat, sweetening agent and optionally intense sweeteners, and characterized in that  
10 sweetening agent is comprising from 25% to 100% of said solidified maltitol, and the remainder of the sweetening agent is selected from the group of sucrose, glucose, fructose, fructose syrups, invert sugar, polyols and mixtures thereof.

Furthermore, the current invention relates to tablets comprising from 2% to 100% of said solidified maltitol, preferably comprising from 2% to 99% of said solidified  
15 maltitol. Tableting with solidified maltitol and magnesium stearate result in hard tablets.

The current invention has the following advantages:

- a low cost-effective process for preparing solidified maltitol.
- 20 - solidified maltitol has an universal use in feed, food, pharma and cosmetic products.
- the solidified maltitol of current invention is particular useful in chewing gum and hard coatings of edible cores.
- bakery products containing solidified maltitol have properties which are  
25 comparable and/or superior to bakery products prepared with sucrose.
- tablets containing solidified maltitol have an acceptable hardness.

30



The current invention is illustrated by way of the following examples.

### Example 1

- 5 3 kg of crystalline maltitol (C★Maltidex CH 16385 – Cerestar product) were loaded in the fluid bed extractable basket (5 kg capacity).  
The inlet air temperature was set to 88°C.  
0.9 kg d.s. of C★Maltidex H 163K9 (Cerestar product - high purity syrup at 70% d.s.) was introduced in the feeding basket. The liquid syrup was sprayed on the powder  
10 through a hydropneumatic multi-head nozzle.  
The granulated product was dried for 30 minutes to reach a moisture content < 0.5%.  
Product was milled with a Retsch SK 100 mill.  
3 kg of said product is then recycled in the fluid bed as powder to be further granulated with C★Maltidex H 163K9.  
15 Granulation/drying/milling were repeated until the maltitol content in the granulated powder had decreased with ca. 3.0% to a maltitol content of 96.3%.  
The maltitol content of the final powder is measured with HPLC.

### Example 2

#### 20 Use of solidified maltitol in bakery products

#### Recipe:

Trial Number	1	2
Margarine	370	370
Sucrose	318	0
Solidified Maltitol	0	318
Whole milk solids	10	10
Salt	14	14
Water	140	140
C★Gel 20006 <sup>1</sup>	102	102

<sup>1</sup> C★Gel 20006 = wheat starch

Flour (Uno)	972	972
Baking powder	15	15

**Procedure:**

- All ingredients except flour, water and baking powder were creamed during 5 minutes at medium speed in Hobart N50 mixer.
- Water was added and mixed during 1 minute. The flour was added and mixing proceeded 2.5 minutes at medium speed.
- 1 kg dough was laminated in 6 steps until 3.5 mm.
- The dough pieces were cut with round plug.
- The dough was baked during 10 minutes at 190°C.

The biscuits were baked on a perforated plate.

**Evaluation of dough preparation:**

After cream preparation the following items were measured:

Trial Numbers	1	2
Temperature of cream (°C.)	24.8	24.8
Spec. volume (cm <sup>3</sup> /g)	1.44	1.47
Stevens viscosity (L.gram) speed 50mm/min, penetration 25 mm with cone	163	141

**Final dough**

Trial Numbers	1	2
Dough temperature °C	26.3	26.3
Stevens viscosity (L.gram) speed 50mm/min, penetration 25 mm with cone	295	334
Weight of 10 pieces dough	75.4	74.3

The use of solidified maltitol results in a dough preparation and a baked product which has similar properties as the products prepared with sucrose.

5 Evaluation of baked products:

Trial Numbers	1	2
Height in mm, calculated to 100 gram of biscuits	93.9	93.4
Spec. volume (g/cm <sup>3</sup> )	1.41	1.52
Indication hardness, breaking 10 biscuits into two parts by cone Stevens Texture Analyzer: Force in grams	1241	1255
Diameter baked product expressed in mm	47.5	47.5
Moisture in %	2.4	2.2

Structure of bottom:

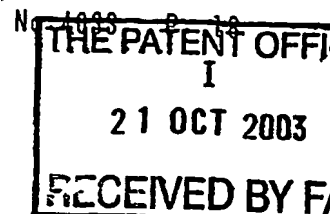
- 10 Biscuits prepared with solidified maltitol or sucrose are comparable: i.e. regular and open.

Example 3:

Use of solidified maltitol in tablets

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Tablets were prepared with solidified maltitol and magnesium stearate.  
Maximum hardness is reached between 35 and 45 KN Main pressure.

**CLAIMS**

1. A process for preparing solidified maltitol and said process is comprising the following steps:
- 5           a) turbulating a powder of maltitol and a fluid at a temperature between room temperature and melting temperature of maltitol for obtaining granulated product,
- b) drying of granulated product,
- c) reducing particle size of dried granulated product for obtaining solid
- 10           product,
- d) optionally recycling said solid product into step a) as powder of maltitol until obtaining in step c) a solid product with a content of maltitol lower than or equal to content of maltitol in powder of maltitol of step a).
- 15           2. A process according to claim 1 characterised in that in step a) the powder of maltitol is turbulated with an inert gas.
3. A process according to claim 2 characterised in that inert gas is nitrogen gas or
- 20           air.
4. A process according to anyone of claims 1 to 3 characterised in that in step b) drying of granulated product is carried out with an inert gas at a temperature above room temperature and below melting temperature of maltitol.
- 25           5. A process according to anyone of claims 1 to 4 characterised in that treatment of step a) is taking place in a fluid bed.
6. A process according to anyone of claims 1 to 4 characterised in that the fluid is a
- 30           maltitol syrup comprising a solid content of between 40% and 80% and maltitol content greater than 70%.

7. A process according to anyone of claims 1 to 6 characterised in that temperature in step a) is between 50°C and melting temperature of maltitol, preferably between 70°C and melting temperature of maltitol, more preferably between 80°C and melting temperature of maltitol.

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8. A process according to anyone of claims 1 to 7 characterised in that content of maltitol of solid product of step c) is at least 1% w/w lower than content of maltitol of crystalline maltitol, preferably 2% w/w, more preferably more than 3% w/w lower than content of maltitol of crystalline maltitol.

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9. A process according to anyone of claims 1 to 8 characterised in that said process is comprising the following steps:

a) loading powder of maltitol into fluid bed basket,

b) having air inlet temperature of more than 80°C,

15

c) adding into the feeding basket of fluid bed as fluid a maltitol syrup with solid content of 70%,

d) spraying through nozzle said fluid onto powder of maltitol for obtaining granulated product,

20

e) drying said granulated product for obtaining a dried granulated product with a moisture content below 1%, preferably below 0.5%,

f) milling of said dried granulated product for obtaining a solid product,

g) optionally recycling said solid product into step a) until obtaining in step f) a solid product with a maltitol content from 95% to 98%, preferably from 95% to 97%, more preferably from 95.5% to 96.5%.

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10. Use of solidified maltitol obtainable according to the process of anyone of claim 1 to 9, in feed, food, pharma and cosmetic products.

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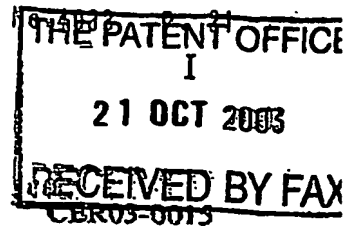
11. Use according to claim 10 characterised in that food products are selected from the group consisting of bakery products, confectionery, chewing gum, and coating of edible cores.

5        12. Bakery product comprising flour, fat, sweetening agent and optionally intense sweeteners, and characterized in that sweetening agent is comprising from 25% to 100% solidified maltitol obtainable according to the process of anyone of claim 1 to 9, and the remainder of the sweetening agent is selected from the group of sucrose, glucose, fructose, fructose syrups, invert sugar, polyols and mixtures thereof.

10       13. Tablets comprising from 2% to 100% solidified maltitol obtainable according to the process of anyone of claims 1 to 9.

21.Oct. 2003 18:01

HOWREY SIMON ARNOLD & WHITE



# **ABSTRACT**

**5**

The present invention relates to a process for preparing solidified maltitol. The solidified maltitol is prepared in a fluid-bed and the product is particularly suitable in hard coatings, bakery products and tablets.

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